

The BLOOM School Box

Future Classroom Scenario

Building a new environmental future

This scenario is part of the BLOOM School Box, which consists of a set of five Future Classroom Scenarios combining bioeconomy into science, technology, engineering and mathematics (STEM) subjects. These resources were developed and tested in classrooms by 20 BLOOM expert teachers from 10 different countries.

This Future Classroom Scenario has been developed as part of the BLOOM project, using the methodology of the Future Classroom Toolkit (<http://fcl.eun.org/toolkit>).



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Ara / Subject

In which subject(s) or area of expertise can the scenario be used?

Subjects: Biology, Chemistry, Biochemistry, Geology, Natural Science

There are two version of scenario:

- for younger students (13 -15 years old)
- for older students (15 -17 years old)

The activity will take around 5 academic hours in class and around 6 academic hours out of the class environment.

Relevant Trends

Relevant trend(s) the Scenario is intended to respond to. E.g. at <http://www.allourideas.org/trendiez/results>

Student-centred Learning: During most activities, students have an active role and the teacher guides them during their activities.

Collaborative Learning: A strong focus on group work.

Inquiry-based learning: Younger students will discover the issue and prepare a science exhibition.

Project-based Learning: students get fact-based tasks, problems to solve and they work in groups. This kind of learning usually transcends traditional subjects. In this learning scenario, older students will develop an inquiry-based learning project.

Lifelong Learning: Learning does not stop when leaving school.

Learning Objectives and Assessment

What are the main objectives? What skills will the learner develop and demonstrate within the scenario? (e.g. 21st Century Skills). How will the progress in achievement be assessed, ensuring the learner has access to information on their progress so they can improve?

Learning objectives

- Students will gain a basic insight into the topic of bioeconomy
- Students will be able to differentiate bioeconomy products from traditional industry products.
- Students will experience implementing the principles of bioeconomy on familiar products.

21st-century skills

Students will improve the following 21st-century skills:

- Learning Skills
- Critical Thinking
- Creative Thinking
- Collaborating
- Communicating

Literacy Skills:

- Information Literacy
- Media Literacy
- Technology Literacy

Life Skills:

- Initiative

- Social Skills
- Productivity

Assessment

- Students will be required to carry out presentations in the classroom (self-assessment; peer-assessment; assessment by the teacher)
- Formative evaluation in addition to summative evaluation (assessment by teacher)
- Assessment of the group work (group work skills are an important part of the project)
- Science exhibition/possible experiments/artefacts from the PBL (depends on the students age)

Learner's Role

What sort of activities will the learner be involved in?

The learners will be involved in student-centred activities:

- The learners will participate in debate activities.
- The learners will be involved in decision-making.
- The learners will be involved in inquiry-based learning and project-based learning.
- The learners will improve their presentation skills.

Tools and Resources

What resources, particularly technologies, will be required?

Computers, laboratory materials, virtual laboratory.

Learning Space

Where will the learning take place e.g. school classroom, local library, museum, outdoors, in an online space?

School classroom, outdoors, local business, school laboratory.

Future Classroom Scenario Narrative

The detailed description of the activity

This scenario consists of two chapters that are meant to be fully implemented in class. Part I and II should take around 5 academic hours (45 minutes per lesson). Part III should take around 6 academic hours (depending on the students' project).

Part I**What is bioeconomy? - (90 min)**

- The teacher introduces the theme by giving some facts about the consequences of using non-renewable resources and about the sustainability of our planet. Could there be a solution?
- The teacher shows a short film in class to introduce bioeconomy: <https://www.youtube.com/watch?v=2xvXkOMRTs4> [in English]
- The teacher divides the class in groups of 3 or 4 students.
- The teacher gives each group a box with several items or pictures (e.g. usual plastic bottles and recycled or bio-based products; non-bio-based fuels and bio-based fuels resulting from bioeconomy; electronic pieces; cotton material and polyester material. For details, see Annex 1). If the teacher can find real products, that will be preferable.

The detailed description of the activity

- Each group, based only on what they know so far, has to divide their items into two groups: materials they think are produced as a result of bioeconomy and items produced by “traditional” industry. Then they have to find characteristics that distinguish them.
- The teacher promotes the debate between groups. The final objective is to demystify the idea that products obtained by bioeconomy are structurally less resistant and less durable and understand that the products obtained by the current industry can also be produced using biological resources.
- The teacher should now show a presentation with the solutions. Should also give more information about the raw material. For details, see Annex 2.
- In class, find a global definition of bioeconomy.

Part II**What can we do with this? (135 min)**

- Add more information about bioeconomy by showing this video: <https://www.youtube.com/watch?v=WEp3fFieZc4> or this one <https://www.youtube.com/watch?v=aiglinxb4XU> [available in English]
- The teacher presents the driving questions to students:
 - For younger students: “What can we do with this fruit/vegetable besides eating it?”
 - For older students: “What can we do with this industry waste* besides putting it in the garbage?” (*it will depend on the local industries existent in the school region)
- The teacher gives each group an actual item:
 - For younger students:
 - Apple, tomato, shrimp, clamshell, banana, nuts or cactus (depending on the resources existent in the school region).
 - Each group has to find examples of usage for as much of the mass of the products, so as to make the most of their potential with minimum waste.
 - For older students:
 - It would be preferable if the class could make a visit to a local industry to find what kind of waste is produced. If this cannot be done, the teacher should present an example of a type of industry waste to investigate potential uses connected to bioeconomy issues.
 - Each group has to make a presentation on the subject to the class.
 - Groups give feedback to each other about the presentations.
 - Students will produce a groups' reflection about the whole activity in collaborative electronic wall (through Padlet or Linoit platform).

Part III (270 min)

Yes we can change the world! (This part can take at least around 4 academic hours or even more, depending on out of class activity and the protocols designed by students)

- For younger students: plan an exhibition to show / explain what they've learned about bioeconomy to the whole school. If possible plan and develop a scientific project.
- For older students: plan and develop a scientific project.

Learning Activities

Link to the Learning Activities created with Learning Designer (<http://learningdesigner.org>)

<https://v.gd/J6Xfix> (Full text available in Annex 3)

Annexes

Annex 1: Pictures for the boxes

| BIO-BASED PRODUCTS | TRADITIONAL PRODUCTS |
|---|---|
|  A Coca-Cola bottle made from a textured, bio-based plastic material. The bottle has a red cap and a red label with the white Coca-Cola script logo. The surface of the bottle is covered in a fine, pebbled texture. |  A standard Coca-Cola bottle made from smooth, traditional plastic. It has a red cap and a red label with the white Coca-Cola script logo. The surface is smooth and glossy. |
|  A blue knit sneaker with a textured, woven upper and a black sole. It is shown from a side profile, resting on a wooden surface. |  A blue perforated plastic clog shoe with a strap across the back. The shoe is made of a solid plastic material with numerous circular holes for ventilation. |

| BIO-BASED PRODUCTS | TRADITIONAL PRODUCTS |
|---|---|
|  | |
|  |  |
|  | |

| BIO-BASED PRODUCTS | TRADITIONAL PRODUCTS |
|---|--|
|  |  |
| |  |
|  |  |

| BIO-BASED PRODUCTS | TRADITIONAL PRODUCTS |
|---|---|
|  |  <p><small>*imagem ilustrativa</small></p> |

Annex 2: Building a new environmental future presentation



Building a new environmental future

Bio-based products

Traditional based products

bloom

Boosting
European Citizens'
Knowledge and Awareness
of Bio-economy
Research and Innovation



BIO-BASED PRODUCT



TRADITIONAL BASED PRODUCT



bloom

Boosting
European Citizens'
Knowledge and Awareness
of Bio-Economy
Research and Innovation



BIO-BASED PRODUCT



TRADITIONAL BASED PRODUCT



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BIO-BASED PRODUCT



TRADITIONAL BASED PRODUCT



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BIO-BASED PRODUCT



TRADITIONAL BASED PRODUCT



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BIO-BASED PRODUCT



TRADITIONAL BASED PRODUCT



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BIO-BASED PRODUCT



TRADITIONAL BASED PRODUCT



bloom

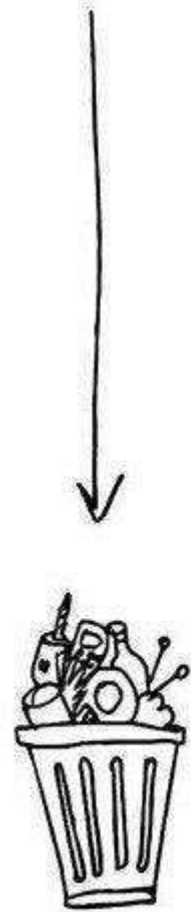
Boosting
European Citizens'
Knowledge and Awareness
of Bio-Economy
Research and Innovation



TRADITIONAL BASED PRODUCT



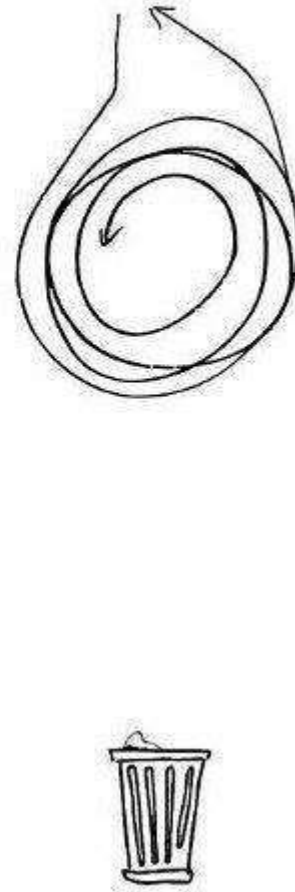
LINEAR ECONOMY



RECYCLING ECONOMY



CIRCULAR ECONOMY



bloom

Boosting
European Citizens'
Knowledge and Awareness
of Bio-Economy
Research and Innovation



Annex 3: Learning Design

| Description | |
|------------------------------|--|
| Context | <p>Topic: Bioeconomy</p> <p>Total learning time: 500</p> <p>Number of students: 20/40 students</p> <p>Description: By viewing a short videos and analysing various materials, students will be able to define and understand the meaning of bioeconomics. In addition, they will be able to find more uses of certain living things, other than the usual and known ones, or to plan ways to increase the production of it, for example, microalgae. At the end, students will organize a Science Fair</p> |
| Aims | <ol style="list-style-type: none"> 1. Students will understand the meaning of the idea-bioeconomics. 2. Students will understand the difference between fossil and biomass resources. 3. Students will make a research about better implementations of bioeconomy for our future. 4. Students will gain a basic insight into the subject of bioeconomy 5. Students will be able to distinguish bioeconomy products from traditional industry products. 6. Students will experience implementing the principles of bioeconomy on familiar products. |
| Outcomes | <p>Knowledge (Knowledge): Students will present their researches to their peers and do scientific projects with their outcomes.</p> |
| Teaching-Learning activities | |
| What is Bioeconomy? | <p>Read Watch Listen 10 minutes 30 students Tutor is not available</p> <p>The group watches a small film to introduce the theme of bioeconomics. https://www.youtube.com/watch?v=2xvXkOMRTs4 At the end of the video, there will be a small discussion about new things that students learnt from this video and what else they would want to know</p> |
| | <p>Discuss 60 minutes 3 students Tutor is not available</p> <p>Each group will have a box with several materials or pictures (e.g.: usual plastic bottles and other, bio-based products; usual fuels and bio-based fuels; electronics pieces...). Each group has to divide their materials or pictures into two groups: materials resulting from fossil fuels and materials resulting from living beings.</p> |
| | <p>Discuss 20 minutes 30 students Tutor is available</p> <p>The teacher promotes the debate between groups so that, at the end, the class has a global definition of bioeconomics.</p> |
| What can we do with this? | <p>Read Watch Listen 6 minutes 30 students Tutor is available</p> <p>Show, to your class a video about bioeconomy (2 videos for younger and older students)</p> |

| | |
|---|---|
| | <p><i>Read Watch Listen 45 minutes 30 students Tutor is not available</i></p> <p>Teacher will present a presentation about bioeconomy at class</p> |
| | <p><i>Investigate 45 minutes 3 students Tutor is not available</i></p> <p>Give each group, a picture or a material (this will depend on the age of students):</p> <p><i>For younger students</i> of 14 years old – in Israel and Portugal: give students materials such as an apple, a tomato, shrimp, clamshell, banana, etc. Each group has to find examples of usages for their material, so as to make the most of their potential.</p> <p><i>For older students</i> of 15 or 17/18 years old: hand out to students sets of images (e.g.: a factory and microalgae, or dump and bacteria....) to investigate how they connect to bioeconomy issues.</p> |
| | <p><i>Produce 30 minutes 3 students Tutor is available</i></p> <p>Using ICT tools, students will present their work to the class.</p> |
| | <p><i>Collaborate 30 minutes students Tutor is available</i></p> <p>Peer-to-peer feedback for each groups of presenters (each group will provide their feedback and assessment to the other groups).</p> |
| | <p><i>Produce 200 minutes 3 students Tutor is available</i></p> <p><i>For younger students:</i> plan an exhibition to show/explain what they have learned about bioeconomy. The exhibition will be planned and prepared by students. Students can prepare posters, models, presentations in order to show their researchers the exhibition. Also, there is a possibility that younger students will be asked to colour an activity book and will present through it their outcomes.</p> <p><i>For older students:</i> plan and develop a scientific project, preferably using a local industry. The scientific project will include PBL steps, following the development of an idea into a product. Students can use materials in order to produce their projects.</p> |
| <p>Yes, we can change the world!</p> | <p><i>Collaborate 20 minutes 3 students Tutor is available</i></p> <p>Students will produce group reflections on a collaborative electronic wall (through Padlet or Linoit platforms).</p> |